UNITED STATES GEOLOGICAL SURVEY

J. W. POWELL DIRECTOR

ATLAS

TO ACCOMPANY

THE TERTIARY HISTORY

OF THE

GRAND CAÑON DISTRICT

DUTTON

DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

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ATLAS

TO ACCOMPANY THE MONOGRAPH

ON THE

TERTIARY HISTORY

OF THE

GRAND CAÑON DISTRICT

BY

CAPT. CLARENCE E. DUTTON U.S.A.

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LIST OF ATLAS SHEETS.

SHEET I. Title page and Table of Contents.

SHEET II. Sketch map showing the approximate distribution of the strata in the western part of the Southern Plateau Province. Scale, $\frac{1}{1,000,000}$. The topography of the colored portion is compiled by J. H. Renshawe, from data and surveys by the U. S. Geographical and Geological Survey of the Rocky Mountain Region, J. W. Powell in charge, and by the United States Geological Survey, Clarence King, Director. The topography of the uncolored portion is compiled largely from surveys under the direction of Capt. George M. Wheeler, U. S. Engineers. Geology by C. E. Dutton.

SHEET III. Sketch map showing the approximate arrangement of the principal faults and displacements in the District of the High Plateaus, and in the Grand Cañon District. The topography is the same as that of the preceding sheet.

SHEET IV. Panoramic view of the Temples and Towers of the Virgen. Drawn by William H. Holmes.

SHEET V. View of the Toroweap Valley looking north from Vulcan's Throne, and view of the Uinkaret Plateau looking northwest from the same standpoint. The two views are continuous. Drawn by William H. Holmes.

SHEET VI. View looking eastward from Vulcan's Throne disclosing the Inner Gorge of the Grand Cañon, the great esplanade, and the upper or outer walls on either hand. Drawn by William H. Holmes.

SHEETS VII and VIII. Map of the Uinkaret Plateau. Topography by J. H. Renshawe. Geology by C. E. Dutton. Scale, one mile to the inch.

SHEET IX. Panoramic views from the summit of Mount Trumbull, on the Uinkaret Plateau, looking eastward and southward, with distant glimpses of the Kanab division of the Grand Cañon and some of its lateral gorges.

SHEET X. Two views—one looking northward from the summit of Mount Trumbull, the other looking north and northeast from the summit of Mount Emma—exhibiting the basaltic cinder cones of the Uinkaret Plateau. Drawn by William H. Holmes.

SHEETS XI, XII, XIII, and XIV. Map of the southern portion of the Kaibab Plateau, and of the Kaibab division of the Grand Cañon, and of the lower portion of the Marble Cañon. Topography by Sumner H. Bodfish, and geology by C. E. Dutton. Scale, one mile to the inch. The inner gorge, designated as an Archæan area, contains remnants of Silurian strata, the extent and distribution of which are not at present accurately known.

SHEETS XV, XVI, and XVII. The Panorama from Point Sublime in the Kaibab. The three sheets form one continuous panorama. Drawn by William H. Holmes.

SHEET XVIII. The Transept. View of a lateral gorge opening into one of the branches of the Bright Angel Amphitheater in the Kaibab. Drawn by Thomas Moran.

SHEET XIX. View looking from the eastern brink of the Kaibab, and overlooking the Marble Cañon Platform. Drawn by William H. Holmes.

SHEETS XX, XXI, XXII, and XXIII. Sheets from the General Topographic and Geologic Atlas of the United States Geological Survey.

It is to be regretted that the survey of this portion of the country is not yet sufficiently advanced to admit of the construction of two additional sheets required to complete the cartography of the Grand Cañon District. It was desired that this atlas should contain the two sheets lying west of Sheets XXII and XXIII of this atlas, but although much material has been obtained for their construction, much more is still required. No attempt to supply the defect has, therefore, been made in the present work.

GEOLOGICAL MAP OF THE

WESTERN PART OF THE PLATEAU PROVINCE

J. H. Renshawe, Del.

Julius Bien's Lith. N.Y.

Geology by C.E. DUTTON, Geologist-in-Charge.

Tertiary | Cretaceous | Jurassic | Trias | Permian | Carboniferous | Silurian | Archæan | Trachyte Rhyolite & Andesite | Basalt

Scale: 16 miles = 1 inch or $\frac{1}{1000000}$ nearly.

SKETCH MAP

OF THE

WESTERN PART OF THE PLATEAU PROVINCE

SHOWING

THE FAULTS OF THE GRAND CAÑON DISTRICT

AND

HIGH PLATEAUS

Scale, about $\frac{1}{1000000}$

1 Grand Wash
2 Hurricane
3 Toroweap
4 West Kaibab
5 East Kaibab
6 Echo Cliffs
7 Tushar
8 Sevier
9 Paunsagunt
10 Hayfield
11 Awapa
12 Thousand Lake
13 West Musinia
14 East Musinia

The continuations of the first six south of the Colorado have been traced only a few miles beyond the river and their further courses (except the Echo Cliffs monocline) are not well known

In the centre of the picture is the western temple. To the right of it is the Mukuntuweap Fork or Little Zion Valley and across it is the eastern temple. On the extreme right is the opening of the Parunuweap, in the middle distance is the inner Cañon of the Virgen.

THE TEMPLES AND TOWERS OF THE VIRGEN

The two Views are continuous. On the left are seen the cascades of lava descending from the Craters upon the heights of the Uinkaret with intervening pediments of upper Carboniferous strata. The effect of the fault is shown by the greater height of the eastern wall in the lower view.

LOOKING UP THE TOROWEAP FROM VULCAN'S THRONE

In the upper View the great lava streams are seen descending from the Plateau wrapping around the fine gable of Carboniferous strata and reaching to the brink of the inner gorge where they plunge into the bottom of the chasm.

THE GRAND CAÑON AT THE FOOT OF THE TOROWEAP-LOOKING EAST

113°20 113°25 113°30 113°35 113° 112°55 112°50

36°35 36°30 36°25

SHEAVWITS PLATEAU

HURRICANE CLIFF

WONSITS PLAIN

UINKARET PLATEAU

KANAB PLATEAU

Diamond Peak

Scale 1 Mile = 1 inch or 1:63360

Geology by C.E. DUTTON

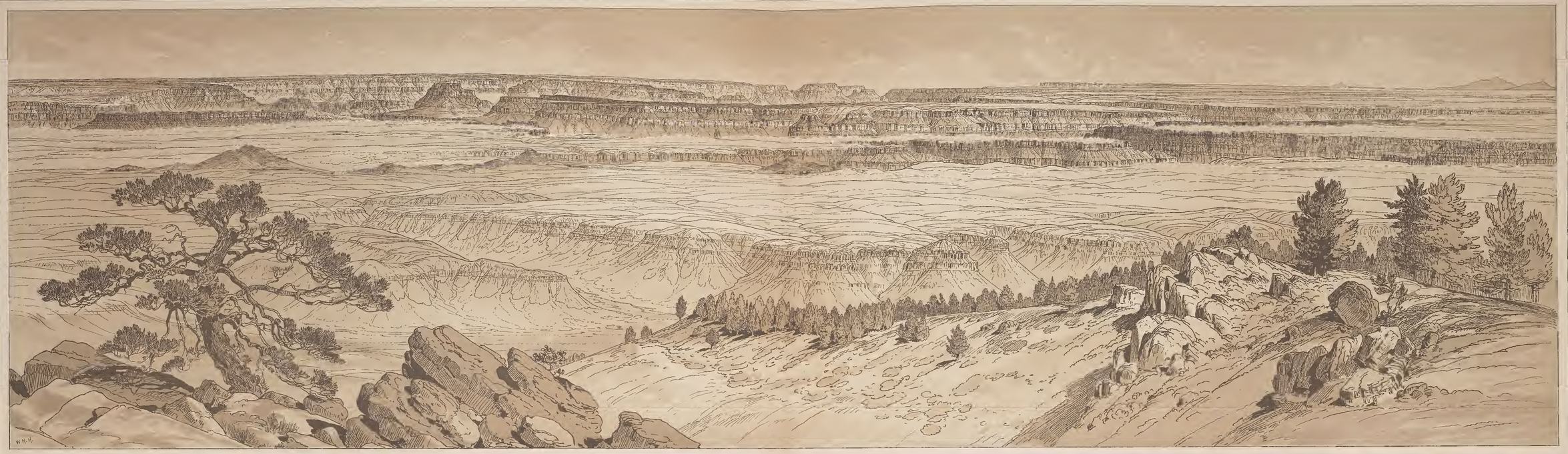
MAP OF THE UINKARET PLATEAU

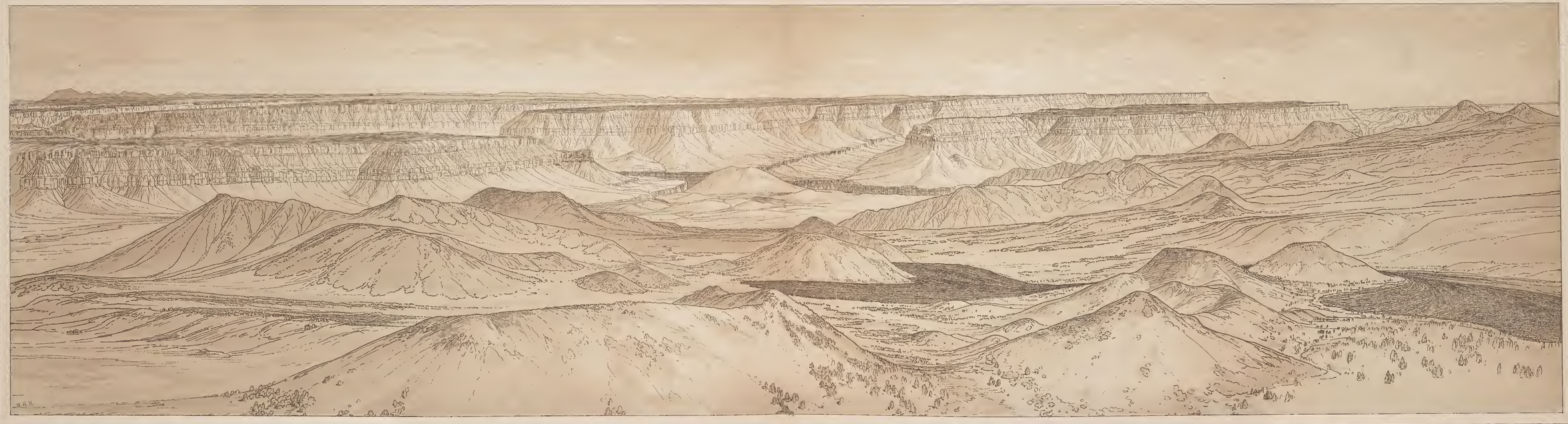
Pliocene P | Archean A | Eocene E

MAP OF THE UINKARET PLATEAU

Scale 1 Mile=1 Inch, or 63360

Geology by C E DUTTON





Upper View looking east; the Grand Cañon in the distance.–Upon the horizon is the summit of the Kaibab. Glimpses of the Cañon in the Kaibab are given at distances varying from 45 to 55 miles. The opening of Kanab Cañon is seen on the left. On the right Cataract Cañon is seen coming from the South. In the foreground is the upper part of the Toroweap Valley.

Julius Bien & Co. lith.

VIEWS LOOKING EAST AND SOUTH FROM Mt TRUMBULL

Lower View looking south from a different standpoint; the Grand Cañon in the distance with the opening of the inner gorge.–Upon the brink of the gorge stands the Crater Vulcans Throne. The lower Toroweap Valley is on the left. South of the Cañon is another lateral Valley along which runs the Toroweap fault dropping the platform on west (right). The fore and middle grounds are filled with many basaltic craters. The darkly shaded spots are very recent outpours of basalt.

UPPER VIEW LOOKING NORTH FROM MT TRUMBULL

In the fore and middle ground are basaltic cinder cones. In the distance on the left is the northern part of the Sheavwits Plateau and the Hurricane Ledge is between. In the middle background is the cliff terminating a part of the main Permian terrace. In the right background are the Vermilion Cliffs, 40 to 50 miles distant and 2000 feet high.

LOWER VIEW LOOKING NORTH-EAST FROM MT EMMA

In the center is Mt Trumbull and far beyond on the right the Vermilion cliffs disappearing a hundred miles away. To the left of Trumbull is the Uinkaret Plateau, a basaltic plateau with Permian beds beneath the lava cap. On the extreme right middle distance is the Toroweap. In the foreground and middle distance are numerous basaltic cinder cones. At the base of Trumbull is the black field of very recent lava.

VIEWS FROM MT TRUMBULL AND MT EMMA

Scale 1 Mile=1 Inch or 63360

Geology by C E DUTTON

GEOLOGIC MAP OF THE SOUTHERN PART OF THE KAIBAB PLATEAU

The areas designated as Archean contain numerous irregular masses of Silurian and probably other lower Paleozoic rocks which cannot be separated at present from the Archæan

Antigrey
A

Red Wall
W

112° 40' 112° 35' 112° 30' 111° 55' 111° 50' 111° 45'

36° 30'

36° 15'

K A I B A B P L A T E A U

D E M O T T E B A R K V A L L E Y

P A R I A P L A T E A U

G R A N D W A S H C L I F F S

B L A C K C A N Y O N

Little De Motte

Milk Spr.

Thompson Spr.

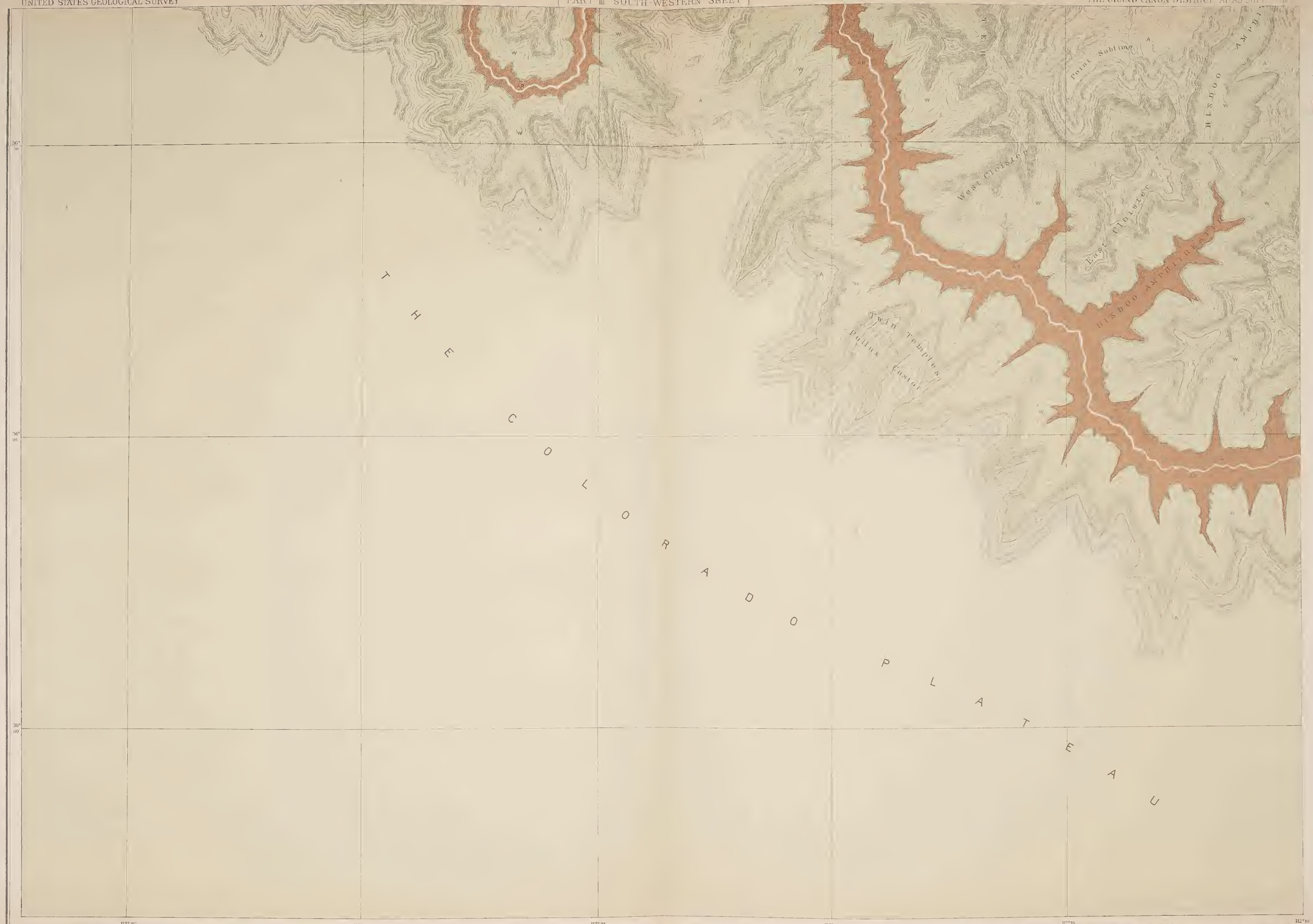
NAKOWAP VALLEY

Scale 1 Mile = 1 Inch, or 1:63360

Julius Bien & Co. lith.

Geology by C.E. DUTTON

GEOLOGIC MAP OF THE SOUTHERN PART OF THE KAIBAB PLATEAU



Scale: 1 Miles = 1 inch

Datum is Sea Level

Geographic Coordinates

GEOLOGIC MAP OF THE GRAND CAÑON IN THE KAIBAB PLATEAU

The areas designated as Archæan contain numerous irregular masses of Silurian and probably other lower Paleozoic rocks which cannot be separated at present from the Archæan.

Aubrey
A
Red Wall
W
Siburian
S
Archean
AR

Scale 1 Mile=1 Inch, or 1:63360

John Bien & Co. lith.

Geology by C.E. DUTTON

GEOLOGIC MAP OF THE SOUTHERN PART OF THE KAIBAB PLATEAU-HEAD OF THE GRAND CAÑON

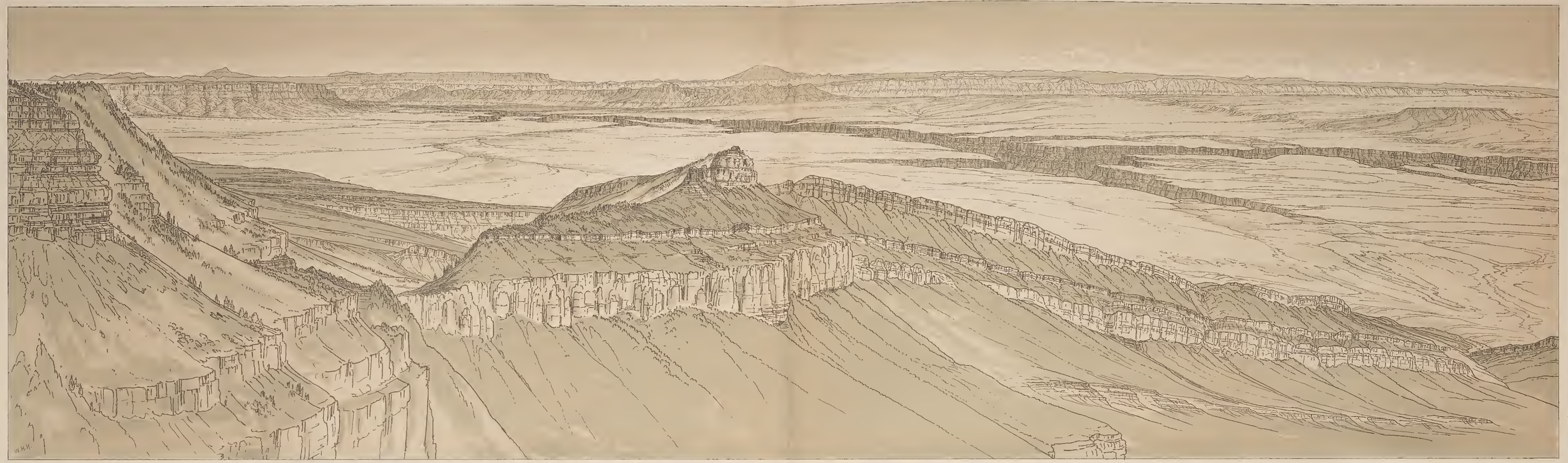
The areas designated as Archæan contain numerous irregular masses of Silurian and probably other lower Paleozoic rocks which cannot be separated at present from the Archæan

PANORAMA FROM POINT SUBLIME

PANORAMA FROM POINT SUBLIME

PANORAMA FROM POINT SUBLIME

THE TRANSEPT, KAIBAB DIVISION, GRAND CAÑON
AN AMPHITHEATER OF THE SECOND ORDER



Upper View looking east - Lower View looking south - The two Views are continuous. The East Kaibab Monocline is immediately in front of the observer carrying the same geological horizon on which he stands down to the platform 2400 to 3000 feet below.

The Marble Cañon is seen in the middle distance and the Echo Cliffs in the background. The Triassic Cliffs terminating the Paria Plateau are seen in the background on the extreme left of the upper View.

VIEWS OF THE MARBLE CAÑON PLATFORM FROM THE EASTERN BRINK OF THE KAIBAB

GEOLOGIC MAP SHOWING THE SOUTH-WESTERN PORTION OF THE MESOZOIC TERRACES

AND THE VICINITY OF THE

Carboniferous	Permian				Cretaceous	Tertiary	Quaternary	Trachyte & Rhyolite	Basalt
CN	P		TR	J	CR		Q		

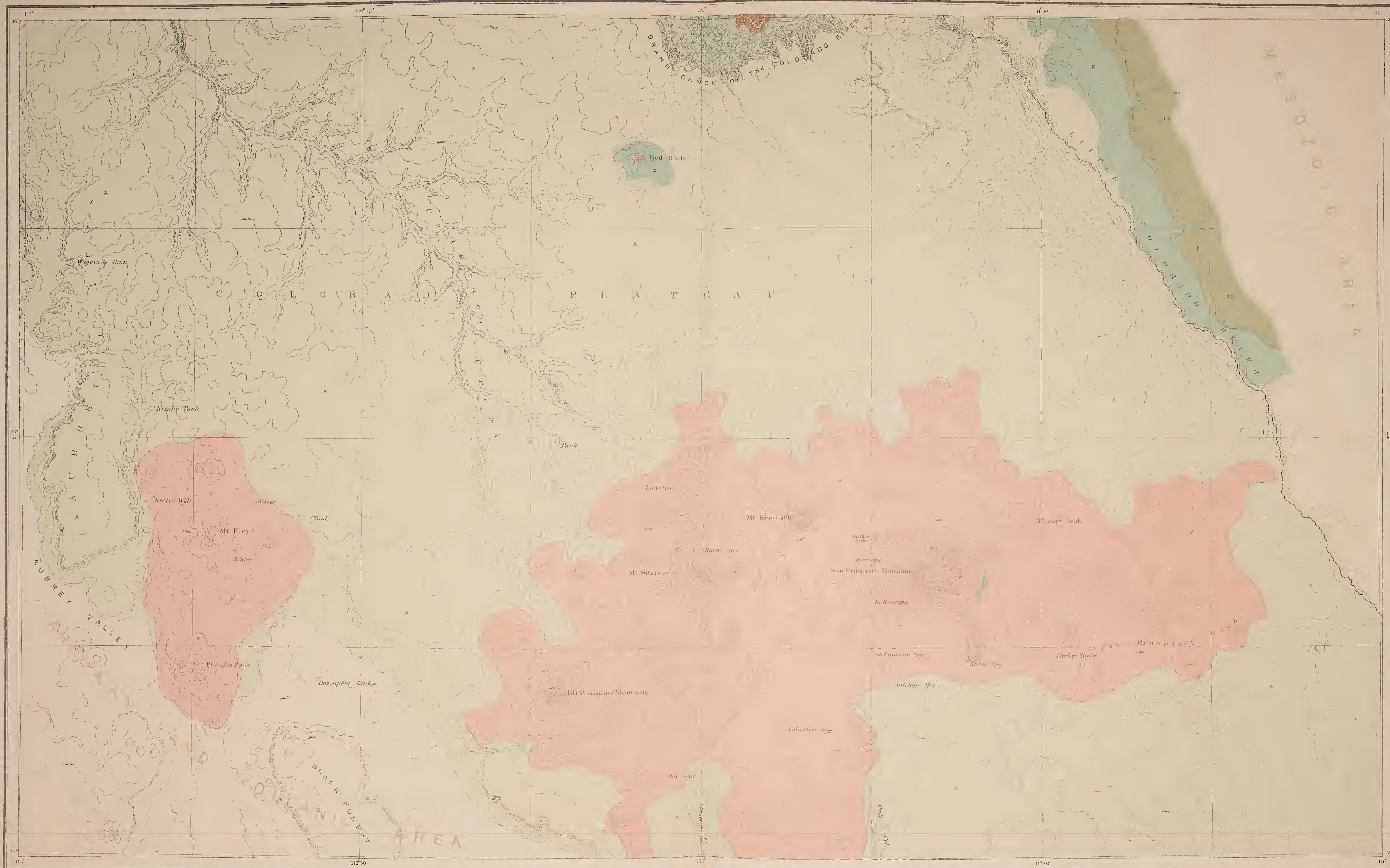
GEOLOGIC MAP OF THE MESOZOIC TERRACES OF THE GRAND CAÑON DISTRICT

AND THE SOUTHERN PORTIONS OF THE KAIBAB PLATEAU

Scale 1 inch = 4 miles

Geology by C.E. DUTTON

GEOLOGIC MAP SHOWING THE KANAB, KAIBAB, PARIA AND MARBLE CAÑON PLATEAUS



Scale $\frac{1}{250000}$, about 4 miles to one Inch

Julius Bien & Co. lith.

Geology by C.E. DUTTON

GEOLOGIC MAP OF THE COLORADO PLATEAU AND SAN FRANCISCO MOUNTAINS

Note. This region has been well surveyed topographically but has been reconnoitred only by the Geologists. The colors therefore are to be regarded only as an approximation to the distribution of the strata

Archæan	Lower Carboniferous	Upper Carboniferous	Permian	Jura Trias	Volcanic
AR	W	A	P	JTR	V